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Response surface approach for sensitivity study of neck forces in restrained child occupant during side-impact crash

(Conference Paper)

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Abstract

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A study is undertaken to characterize the Neck Force (Nf) of a CRS restrained 3 year old child occupant involved in lateral and oblique side impact. The Response Surface Method is used to map the parameter sensitivity upon the Nf for impact speed of 32.2 km/h (20 mph) both individually as well as cross interactively. Design of Experiments is used with Latin Hypercube Sampling involving six predictors. A study of the response plots and statistical data obtained provide insights on the characteristic of each predictor with respect to the neck forces sustained. Greater parameter significance affecting neck forces is seen for narrow impact angles ($\varphi \leq 60°$). Singularly, the impact angle parameter is revealed to be largely the most sensitive parameter to affect neck force especially at narrow angles. The critical range for this is identified to be between angles 50° and 70° while a secondary critical range is observed for angles below 34°. © (2014) Trans Tech Publications, Switzerland.

Author keywords

Child restraint system | Neck force | Response surface method | Vehicle side impact

Indexed keywords

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